



Armed Forces College of Medicine AFCM



Histological structure of Liver & Gall bladder

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Intended Learning Outcomes

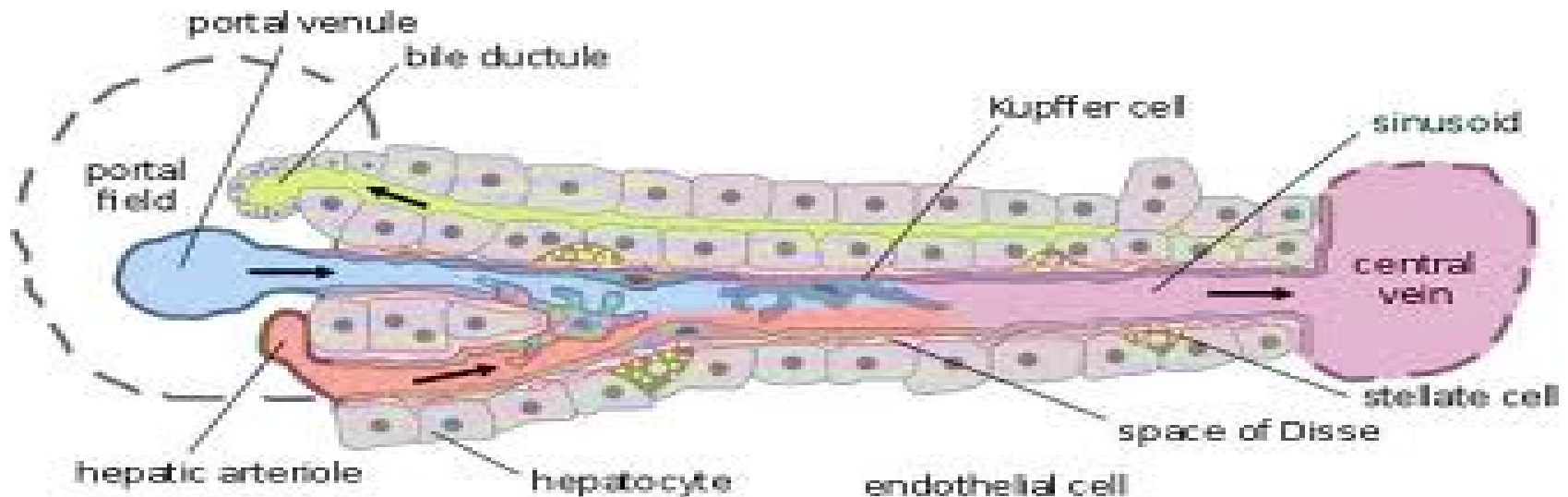


- By the end of this lecture you should be able to:
- Describe the cells lining the blood sinusoids.
- Describe the structure of the space of Disse.
- Correlate the structure of space of Disse to its function.
- Correlate the structure to the function of Ito cells (Hepatic stellate cells).
- Correlate the altered microscopic structure of Ito cells to liver fibrosis.
- Describe the structure of intra and extra hepatic biliary passages and gall bladder.
- Describe the structure of gall bladder.

Blood sinusoids



- **Are blood channels present between the hepatocytes that conduct blood from the portal area to the central vein.**



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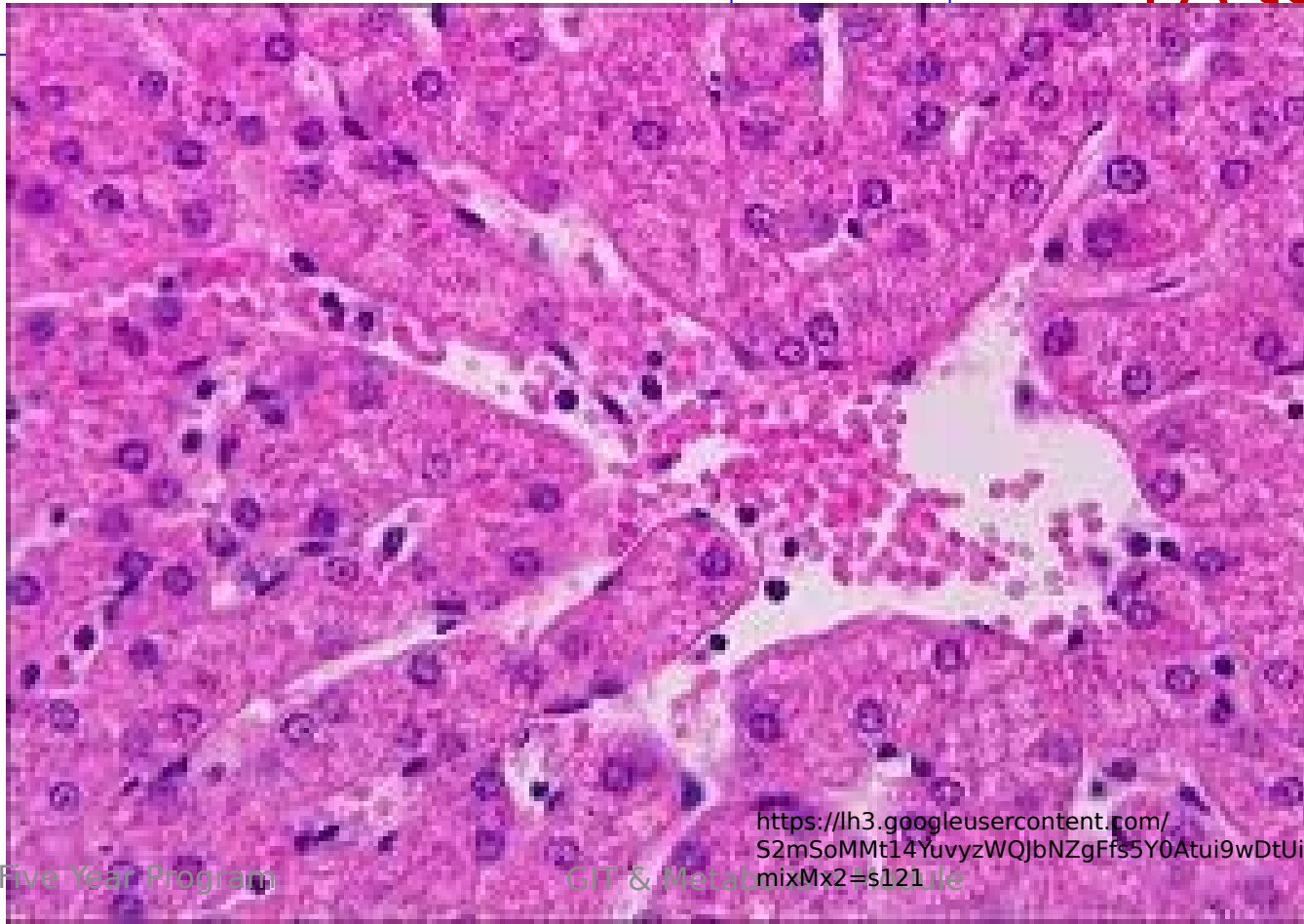
Blood sinusoids



Blood
between

channels

Carry blood from
PA to CV



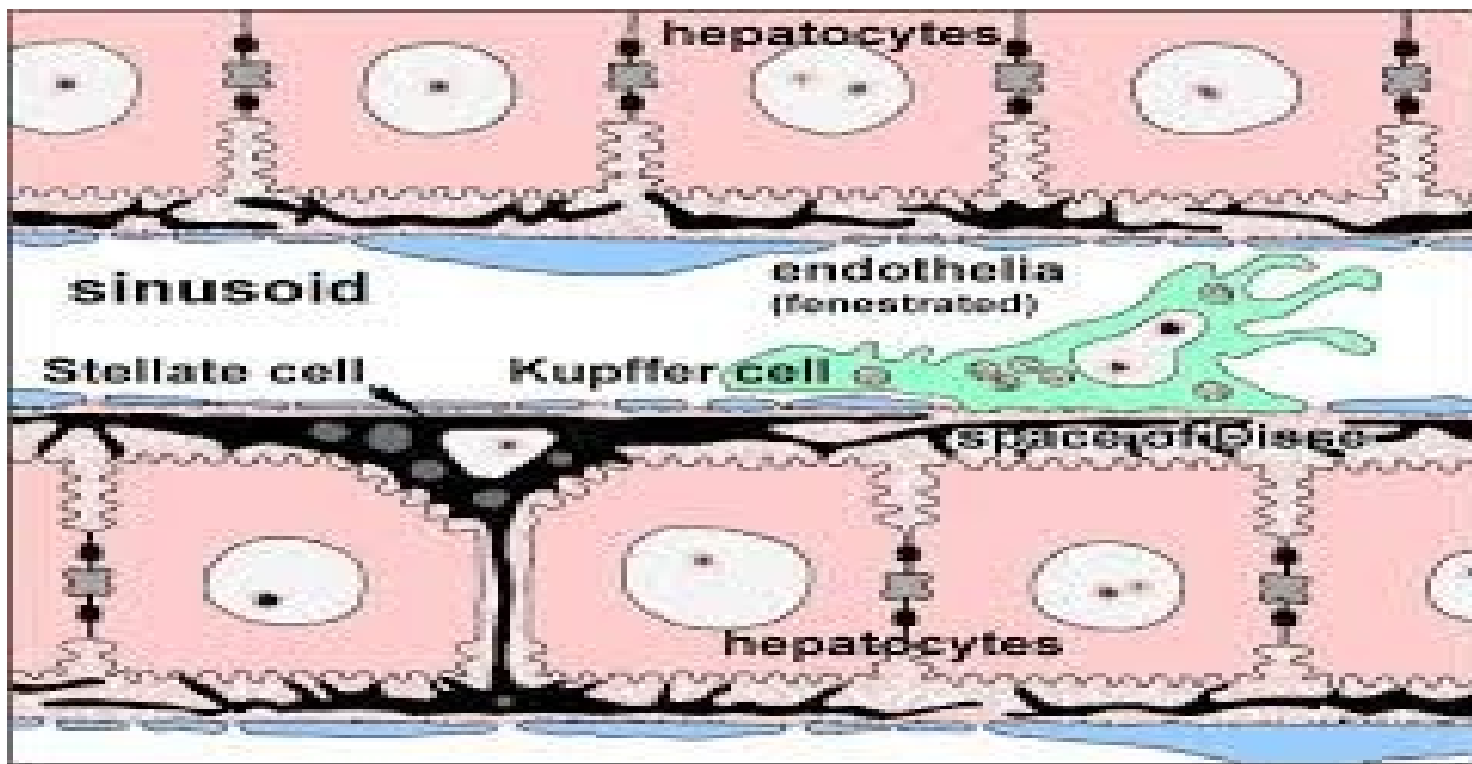
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Blood sinusoids are lined by:



**Endothelial
cell**

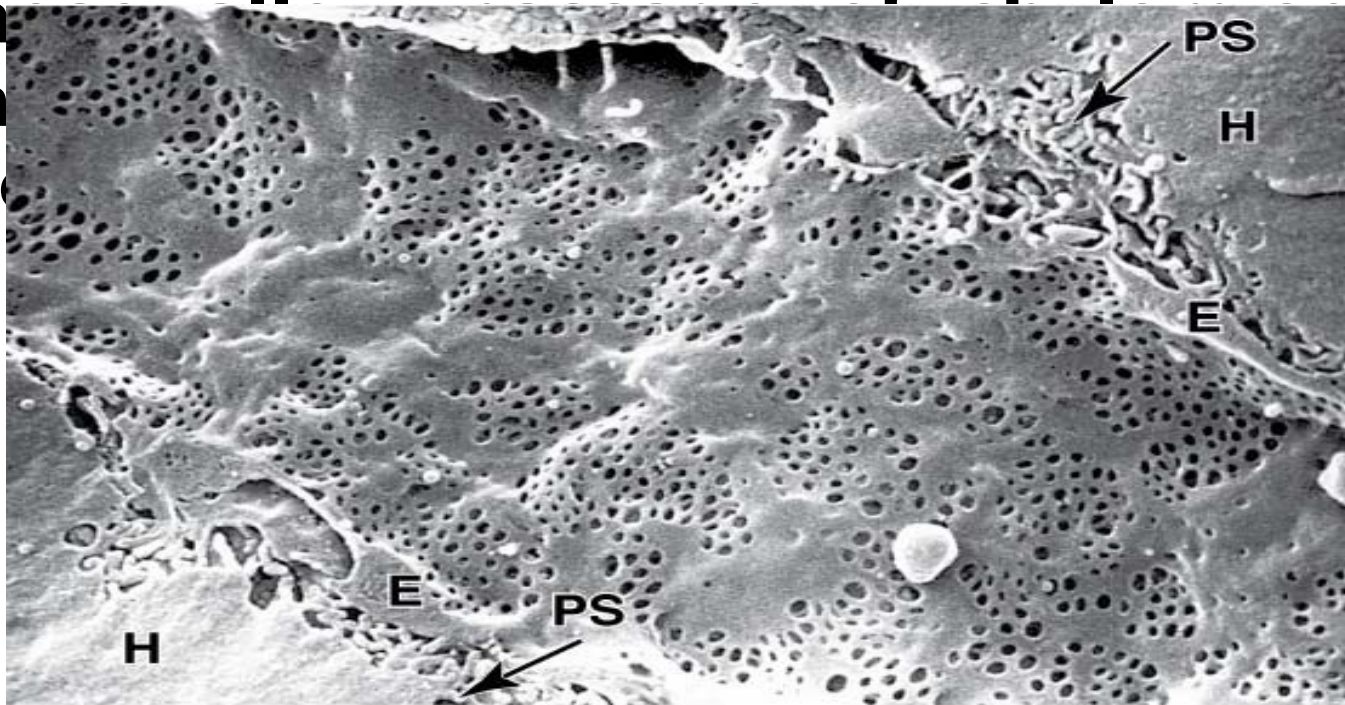
**Von Kuppfer
cell**



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Endothelial cells

- Fenestrated cells
- Fenestrations and pores lack diaphragm.
- There are large gaps between the endothelial cells.
- The "fenestrated" cells are found in the endothelium of the



Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas*, 12th Edition: <http://www.accessmedicine.com>

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Von Kupffer cells

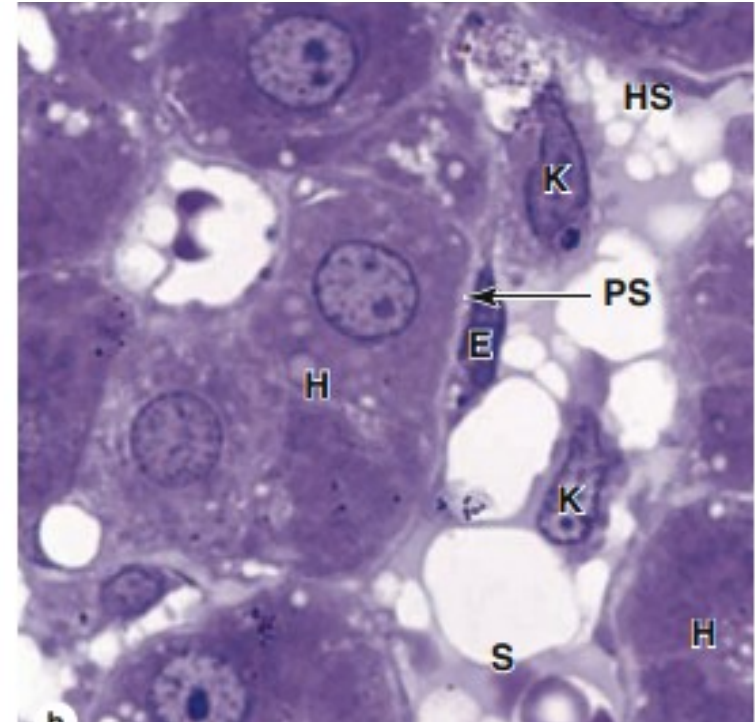
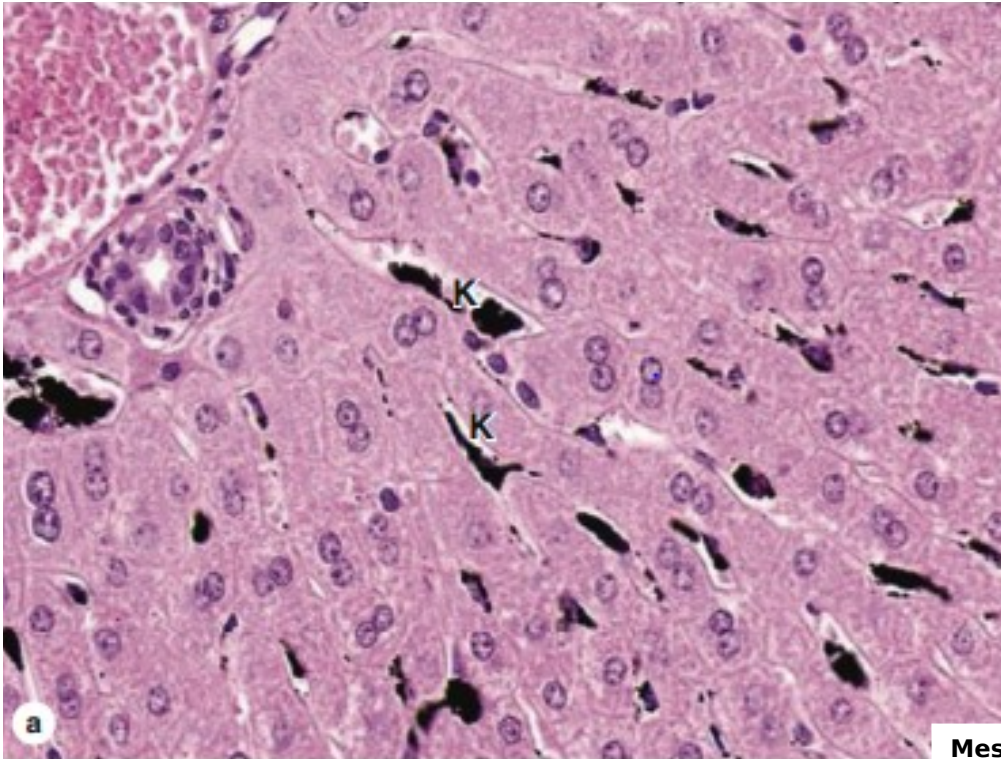


Large phagocytic branching cells between the endothelium.

Origin: monocytes

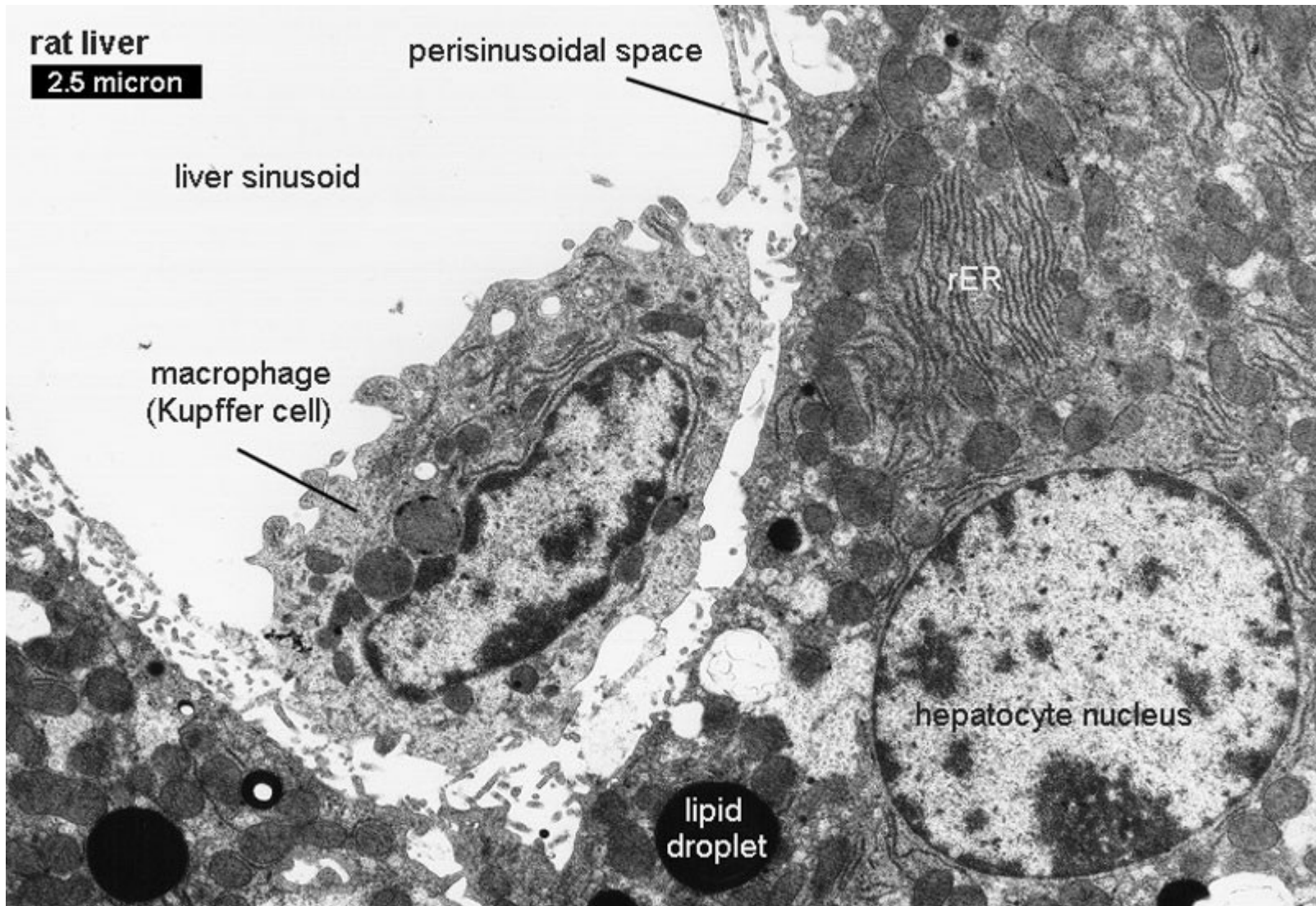
LM : nucleus is large and irregular, multiple processes

EM: surface microvilli and pseudopodia, lysosomes, rER, Golgi apparatus, phagocytic vesicles.



Mescher AL: Junqueira's Basic Histology: Text and Atlas, 14th Edition
<http://www.accessmedicine.com>

Von kupffer cells



<https://lh3.googleusercontent.com/talEgXakmfEZq0axnYw8kn6Jgiumiw4tnNfkMi-Y-2p3Bc3OExZGPvRH9j7NNwV1CvlnRw=s124>

Von kupffer cells

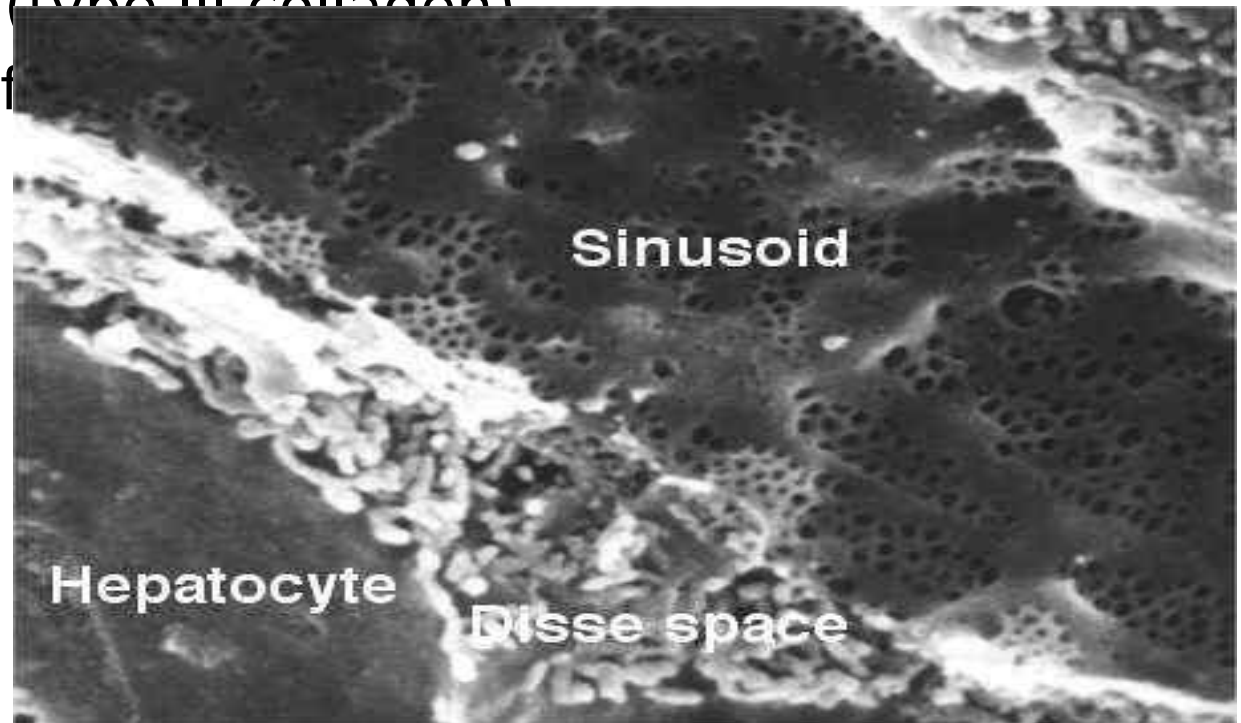


- **Function:**
 1. **Phagocytosis** of foreign bodies and bacteria.
 2. **Phagocytosis** of old RBC and free the iron for reuse.
 3. Prevents obstruction of the sinusoids by debris coming from the gut.
 4. Antigen presenting cell.

Space of Disse



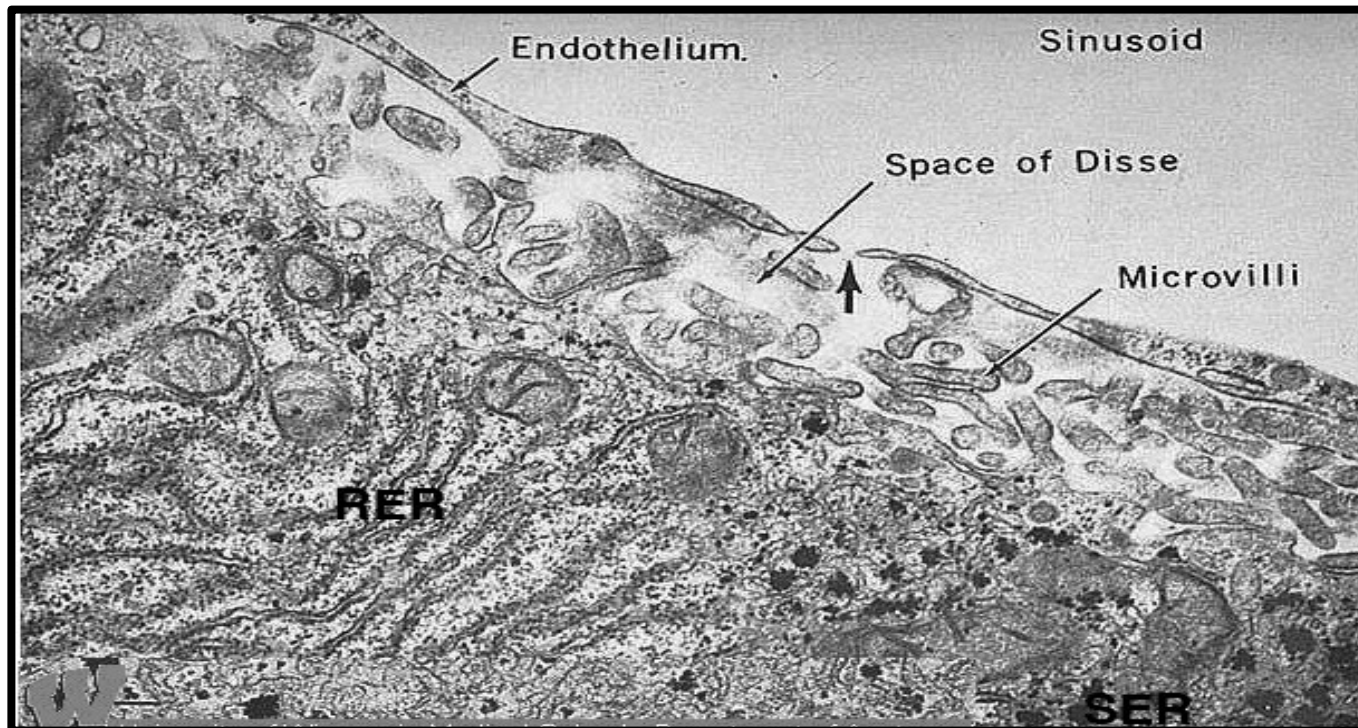
- **Between the hepatocytes and sinusoidal wall & contains:**
 - **Microvilli:** from the hepatocytes.
 - **Plasma.**
 - **Ito cells** : fat storing containing vitamin A -rich lipid inclusions.
 - **Reticular fibers** (type III collagen)
 - Occasional nerve fibers



<https://lh3.googleusercontent.com/O4ISWuFcexDCDU9B-zwp4h-LNFqtlgA-kJe-doPYNug7KON9ZILjrAVndQbjDA0Qhx4G=s113>

What is the space of Disse?

- It is the space between the hepatocytes and sinusoidal wall.
- It contains: - Microvilli from the hepatocytes - Plasma. - Reticular fibers Occasional nerve fibers. - Ito cells (fat storing)



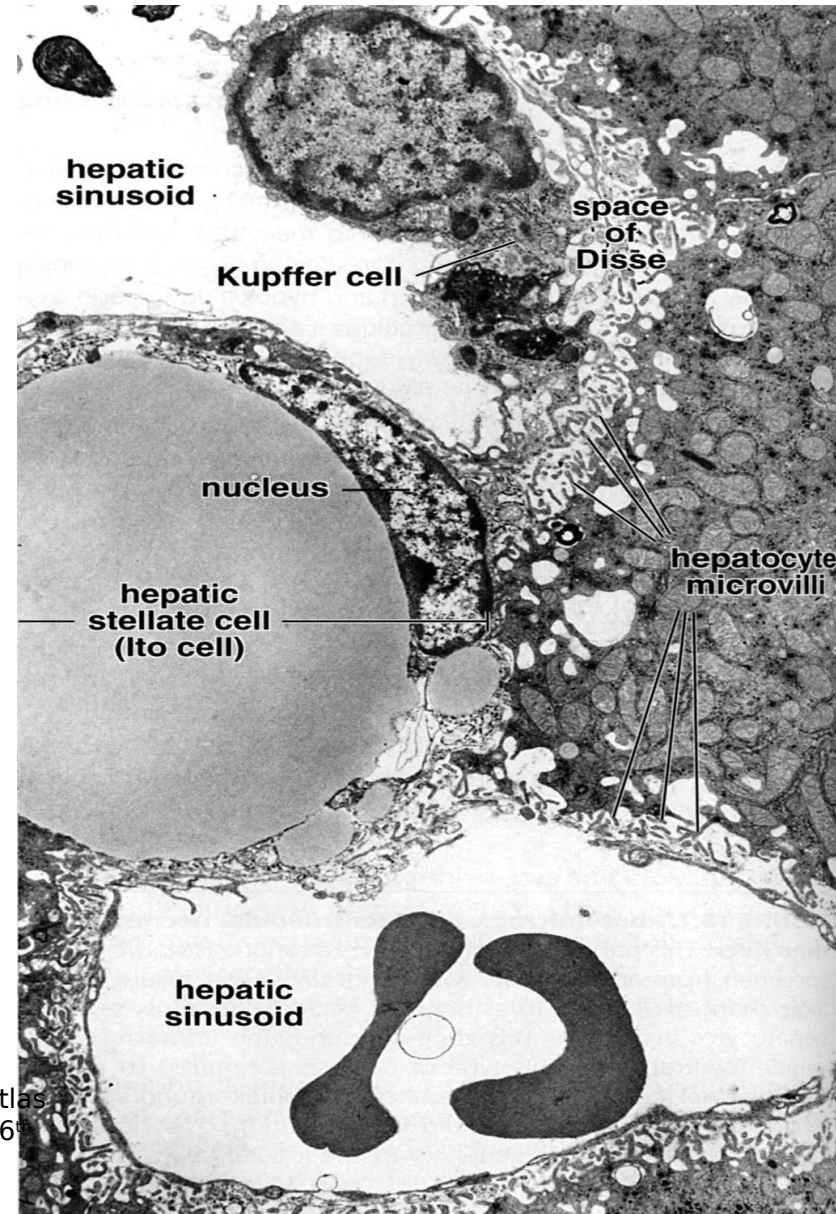
Space of Disse



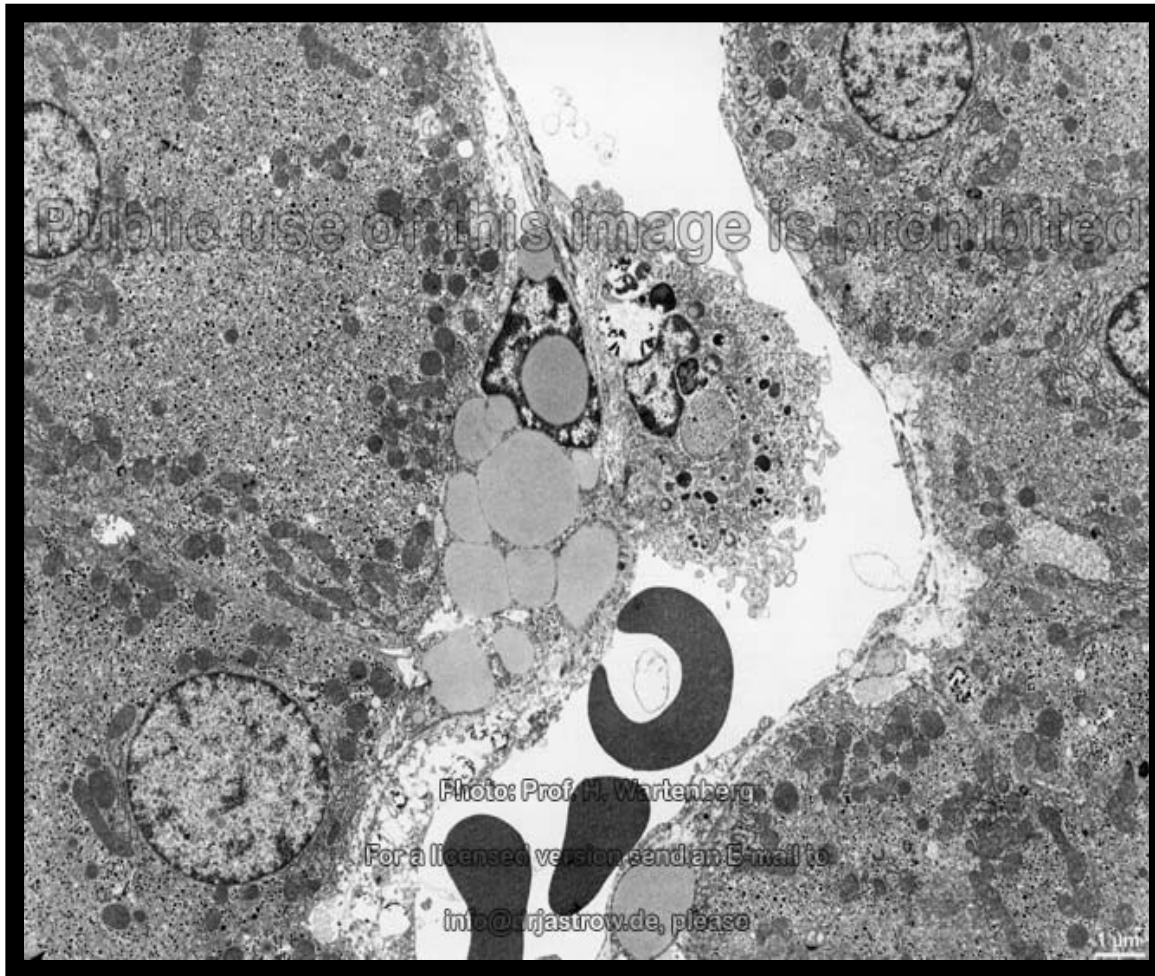
Ito cells (Hepatic stellate cells):

- Contain lipid droplet.
- Contain **vitamin-A**
- Stores much of the body's vitamin A.
- In diseases: Ito cells proliferate to fibroblast. Leading to fibrosis.

Ross MH, Pawlina W: Histology A Text & Atlas with correlated Cell & Molecular Biology, 6th Edition.



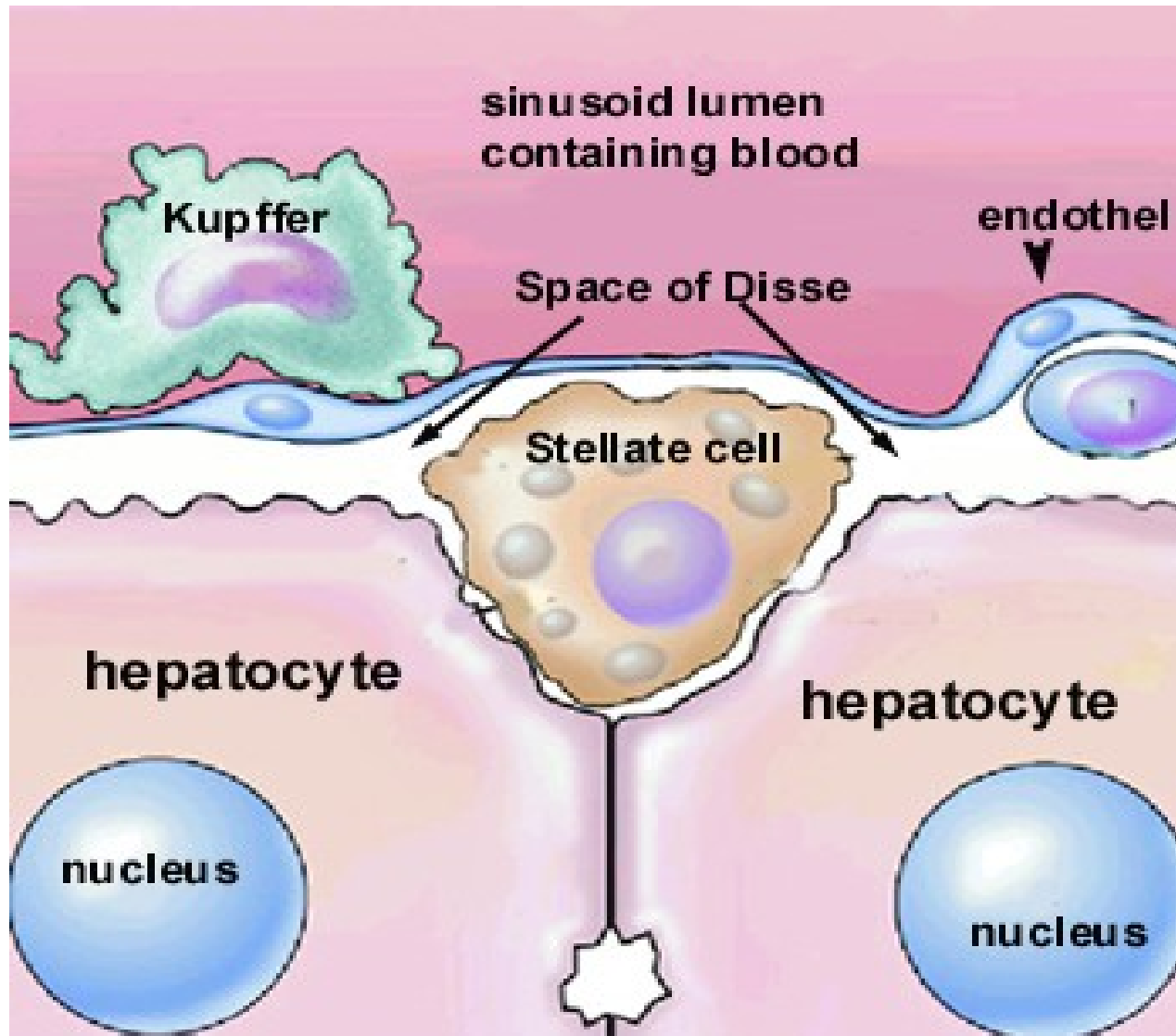
Space of Disse



Ito cell

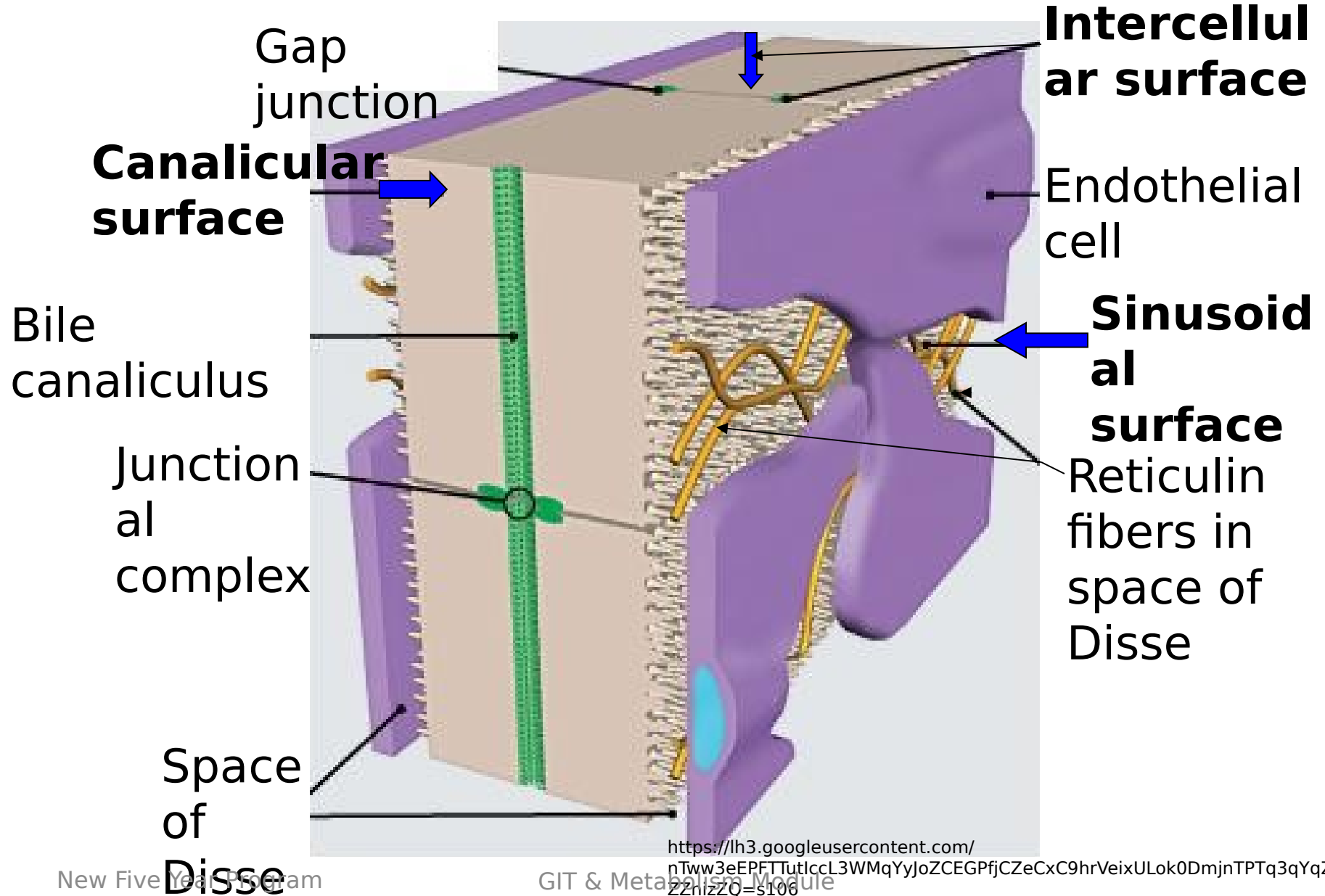
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Space of Disse



<https://lh3.googleusercontent.com/eSIRDfqocnJMPnCSAMUIh61ZFPM1DbliHoQhqktBxX7ZEPHPDX6xpsHJkik7aHEr7LE0=s86>

The Liver



Medical Application



- **Liver fibrosis: Hepatic stellate cells** proliferate into myofibroblasts and produces connective tissue that can fill the perisinusoidal space and interfere with metabolic exchange.

Space of Disse



- **Function:**

1. Filtered plasma is in direct contact with the hepatocytes so it permits exchange of materials between blood and hepatocytes.
2. Prevents collapse of sinusoids. **How??**

- **Liver sinusoids are prevented from collapse by:**

1. Reticular fibers for support
2. microvilli of hepatocyte
3. Hydrostatic pressure of sinusoids is similar to that space of Disse



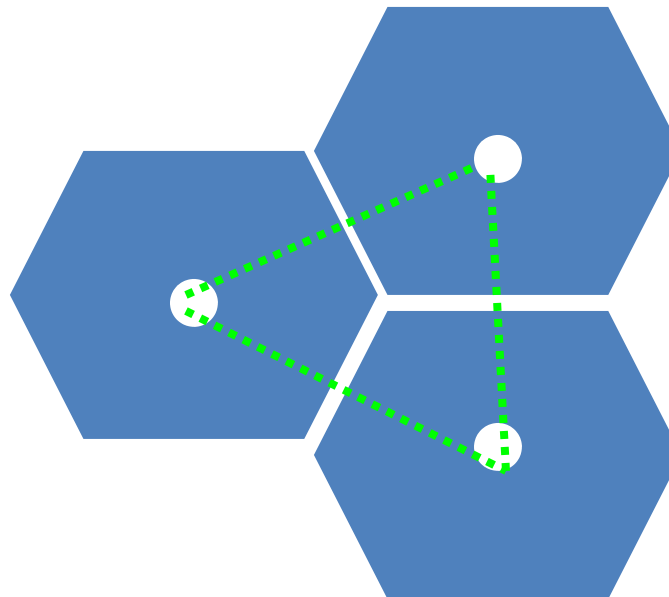
The liver

Classification of hepatocyte organization

**Liver
acinus**

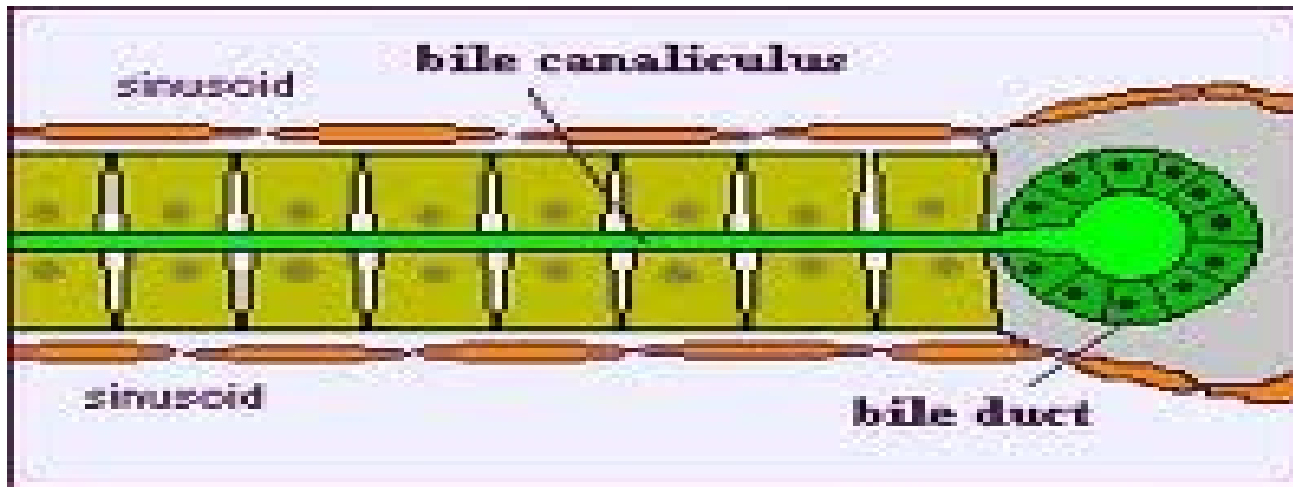
**Portal
lobule**

**Classic
Hepatic
lobule**

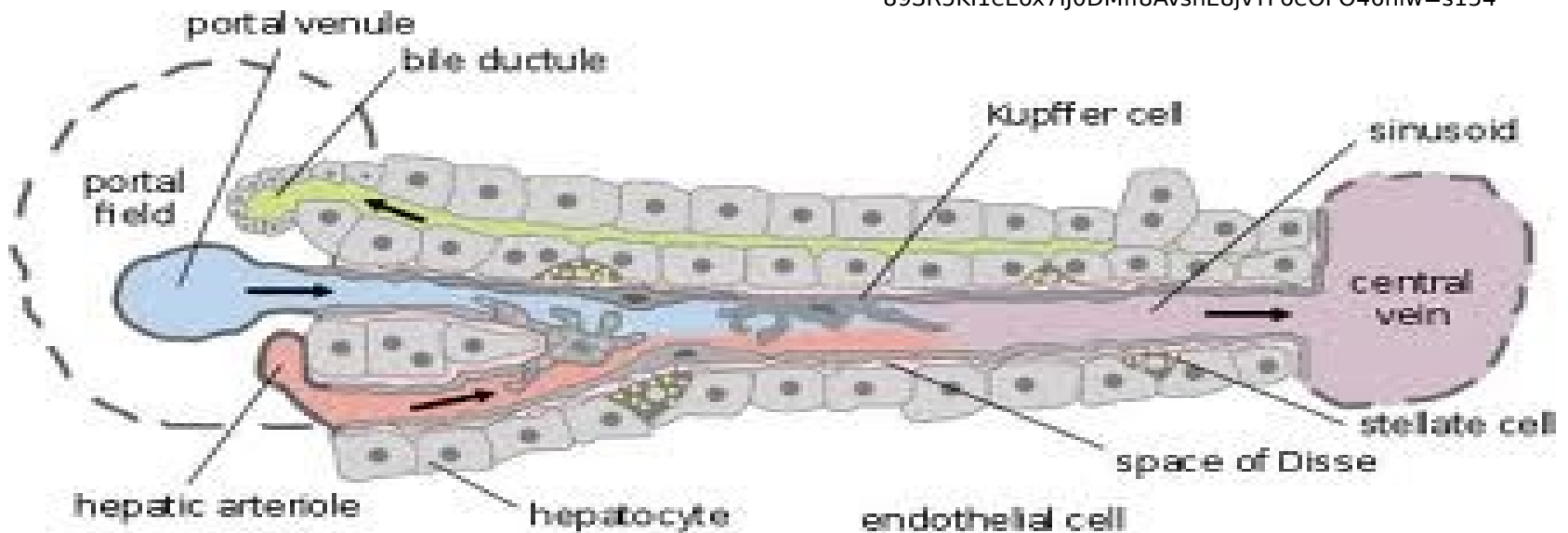


Triangular mass of liver
from 3 adjacent
lobules.
The bile is drained into
the portal tract.

Bile Flow



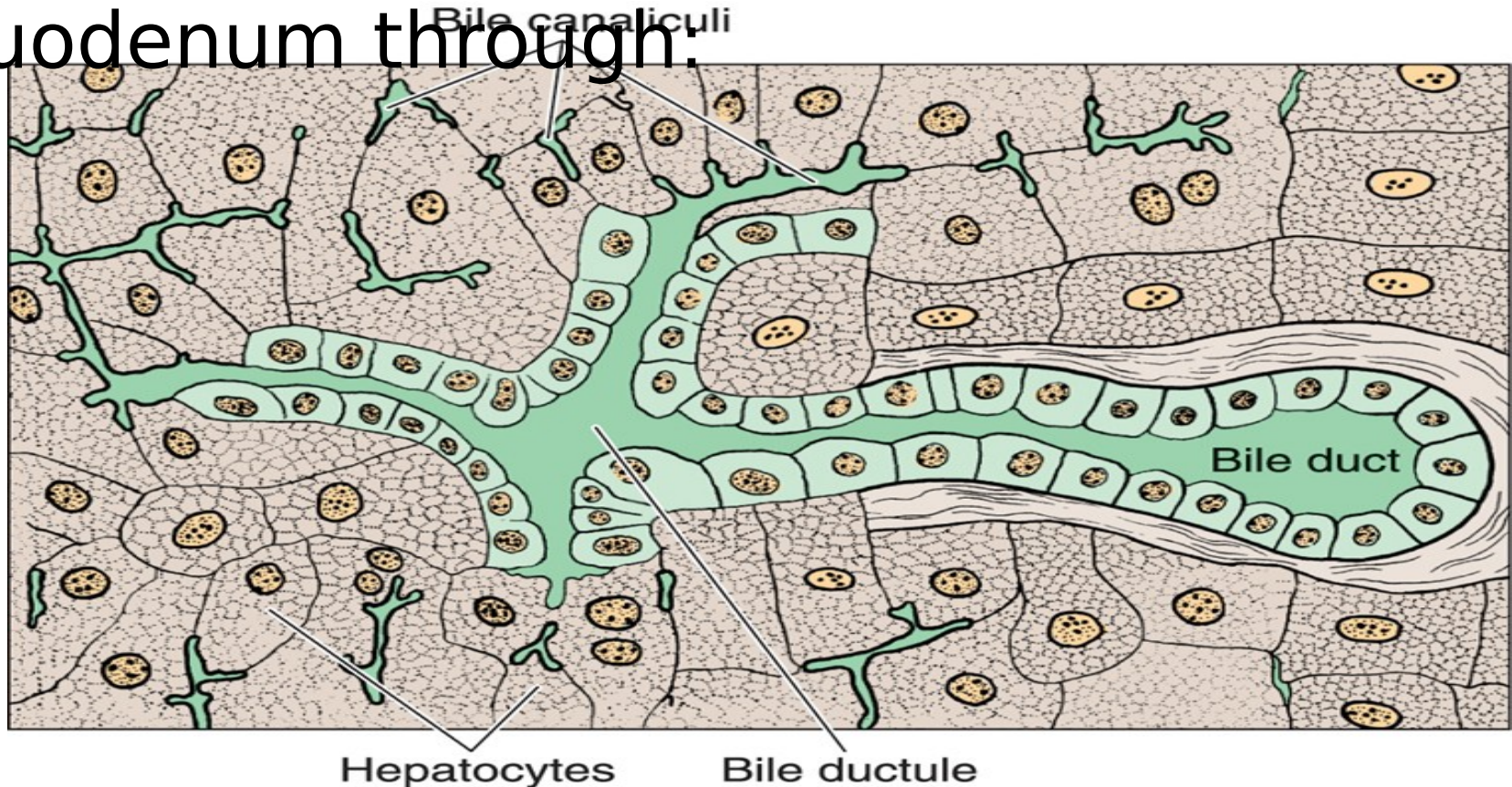
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Bile Flow



Bile is produced from hepatocytes and released in bile canaliculi and flows to the duodenum through:



Mescher AL: Junqueira's Basic Histology: Text and Atlas, 14th Edition
<http://www.accessmedicine.com>

Bile Flow



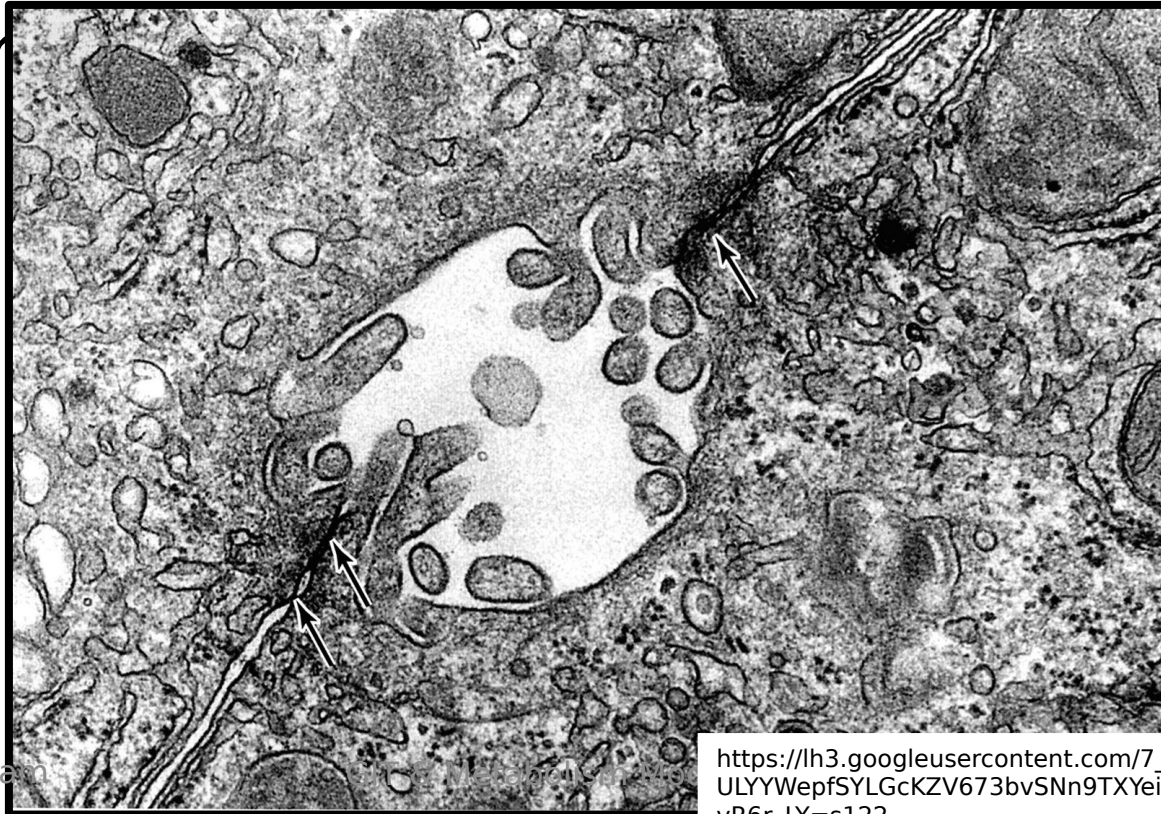
- Bile canaliculi
- Canal of Herring
- Bile ductules
- Bile ducts in portal tract areas
- Intrahepatic bile duct
- Extrahepatic bile duct Rt & Lt join
- Common hepatic duct
- Common bile duct

Bile Flow



- **Bile canaliculi:** lined by hepatocytes and contain microvilli from adjacent hepatocytes.

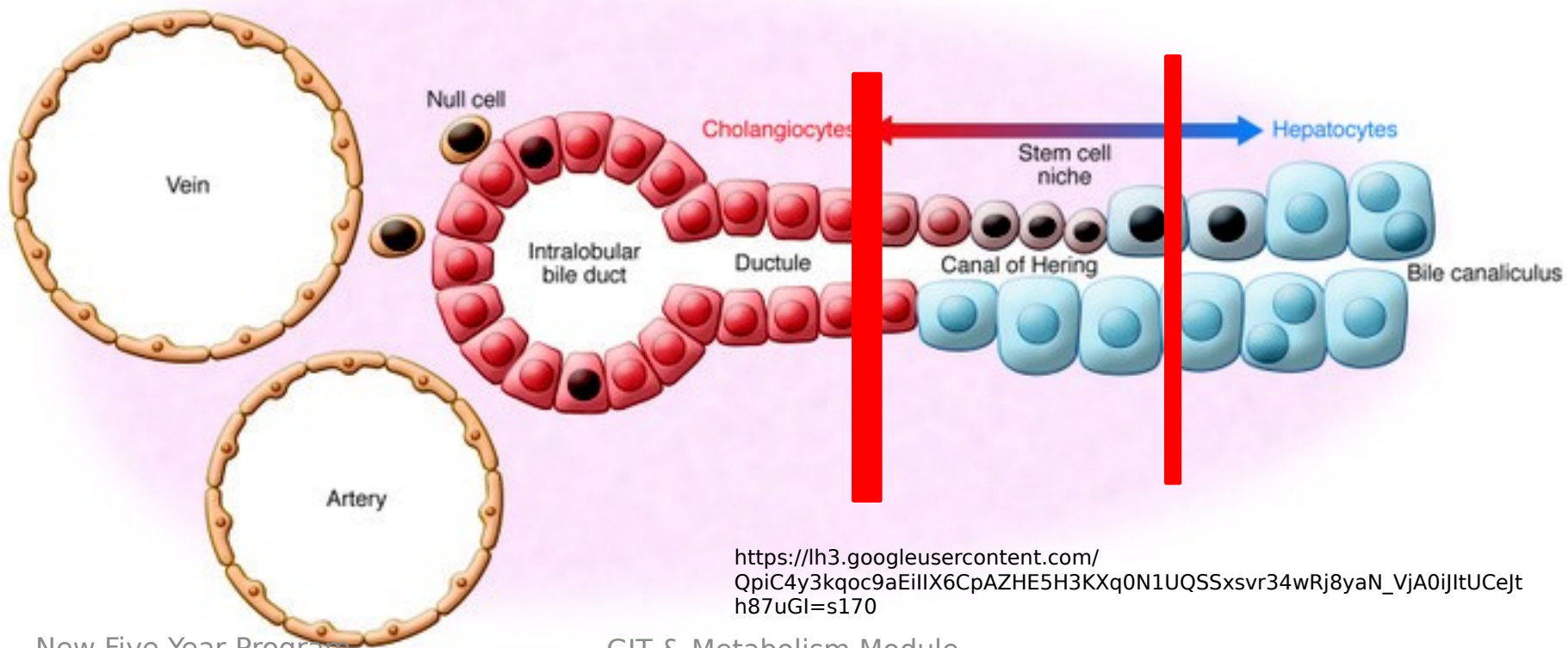
Continuous tight junctions: seal them from



Bile Flow



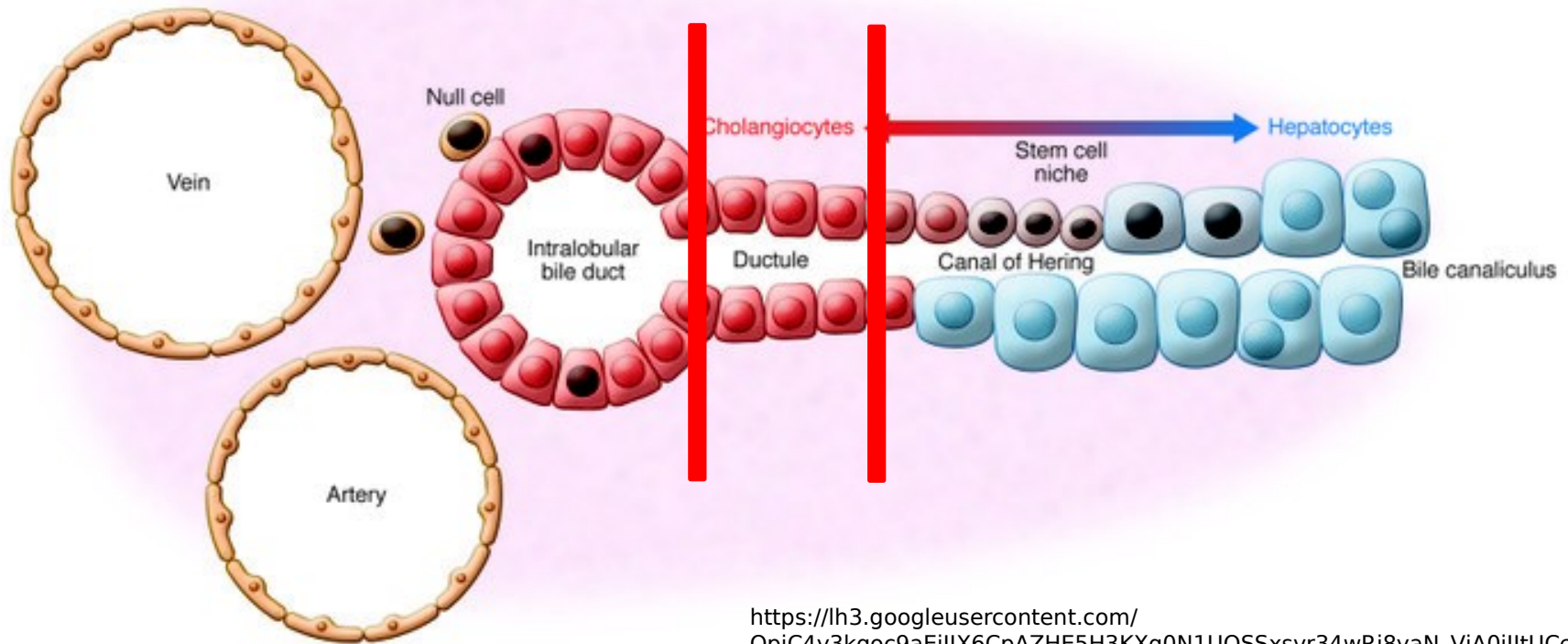
- **Canal of Herring:** partly lined by hepatocytes and partly by low cuboidal cells (**cholangiocytes**).



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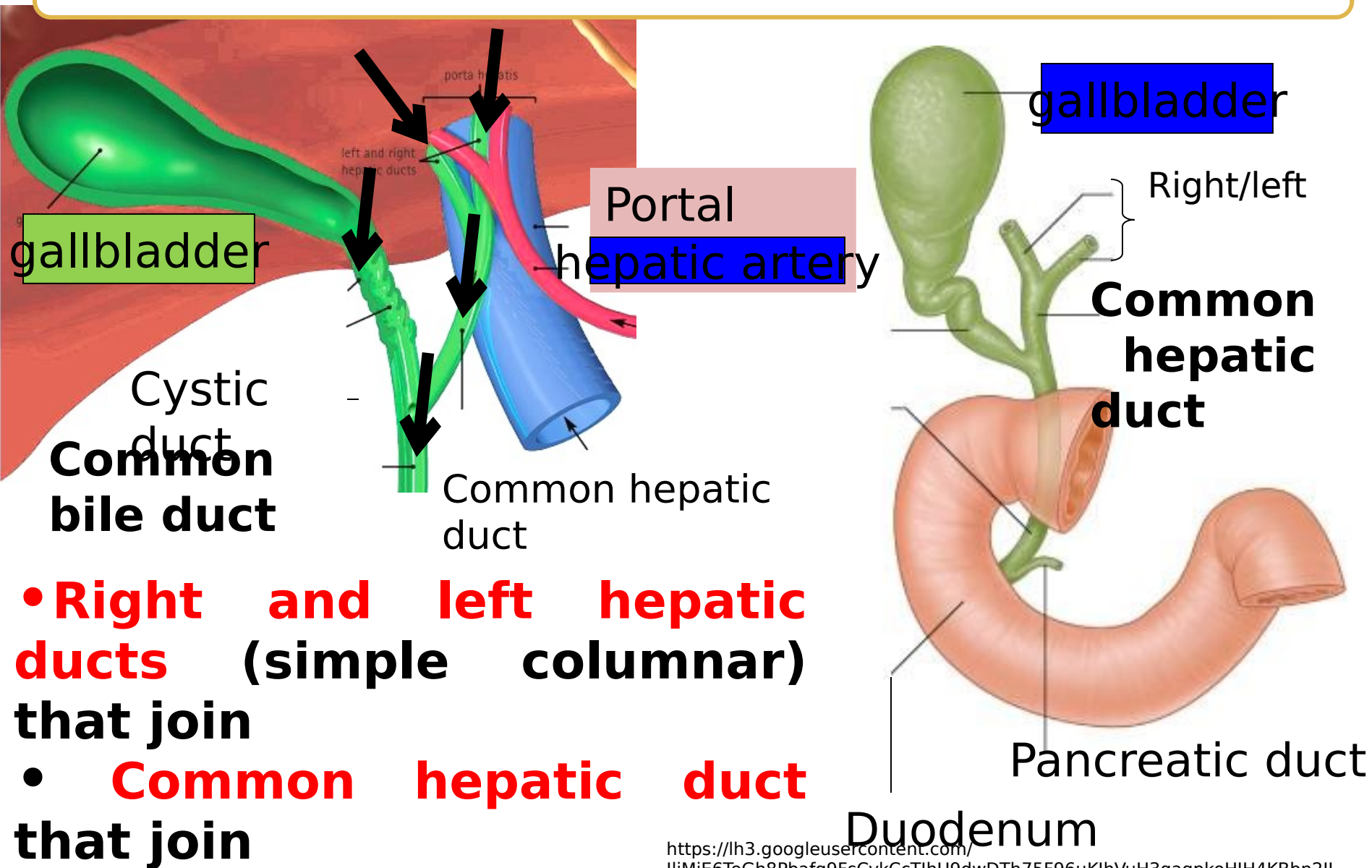
Bile Flow

- **Bile ductules** lined by low cuboidal cells.
- **Bile ducts:** lined by cuboidal cells and are found in the portal tract areas. They



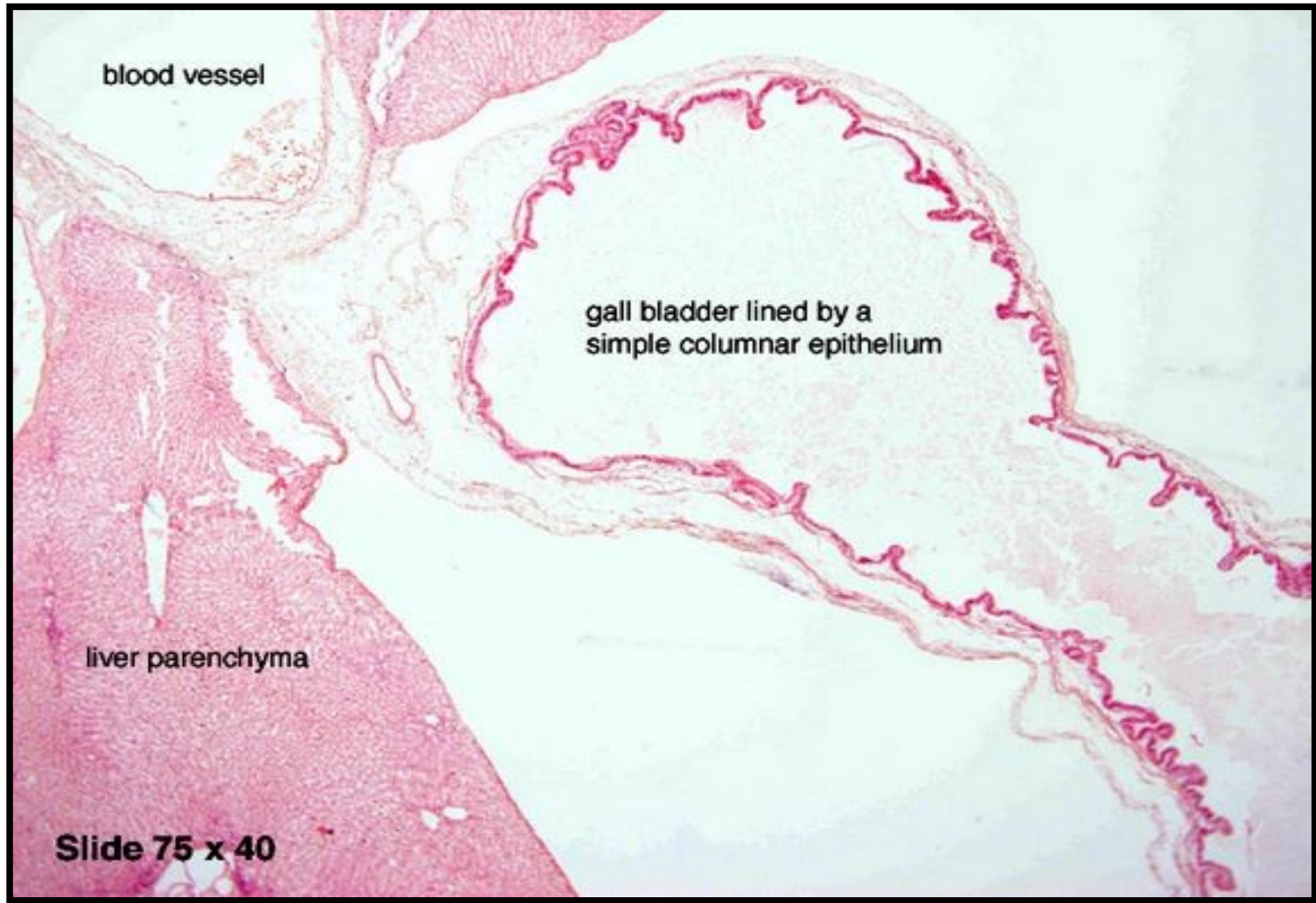
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Extrahepatic Bile ducts and Gall Bladder



- **Right and left hepatic ducts** (simple columnar) that join
- **Common hepatic duct** that join
- **the cystic duct forming**

Liver & Gall Bladder



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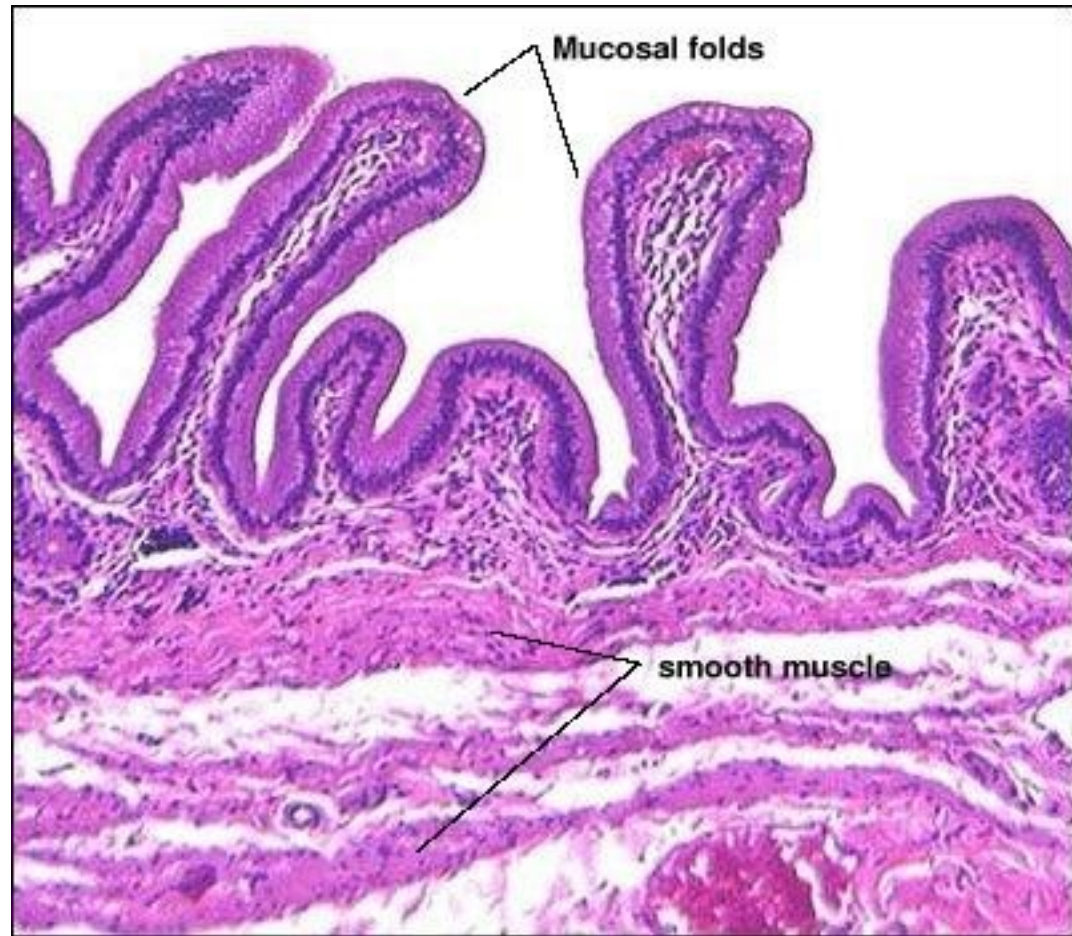
The Gall Bladder



Mucosa

Muscle layer

Fibrous coat



https://lh3.googleusercontent.com/OaALpIZy0aYKVSBTek_aextULO7smU1pfvjPIZ7xACPLKiMMNrnUBPoxiSVNYjfWWG93ilQ=s97

Gall Bladder Epithelium

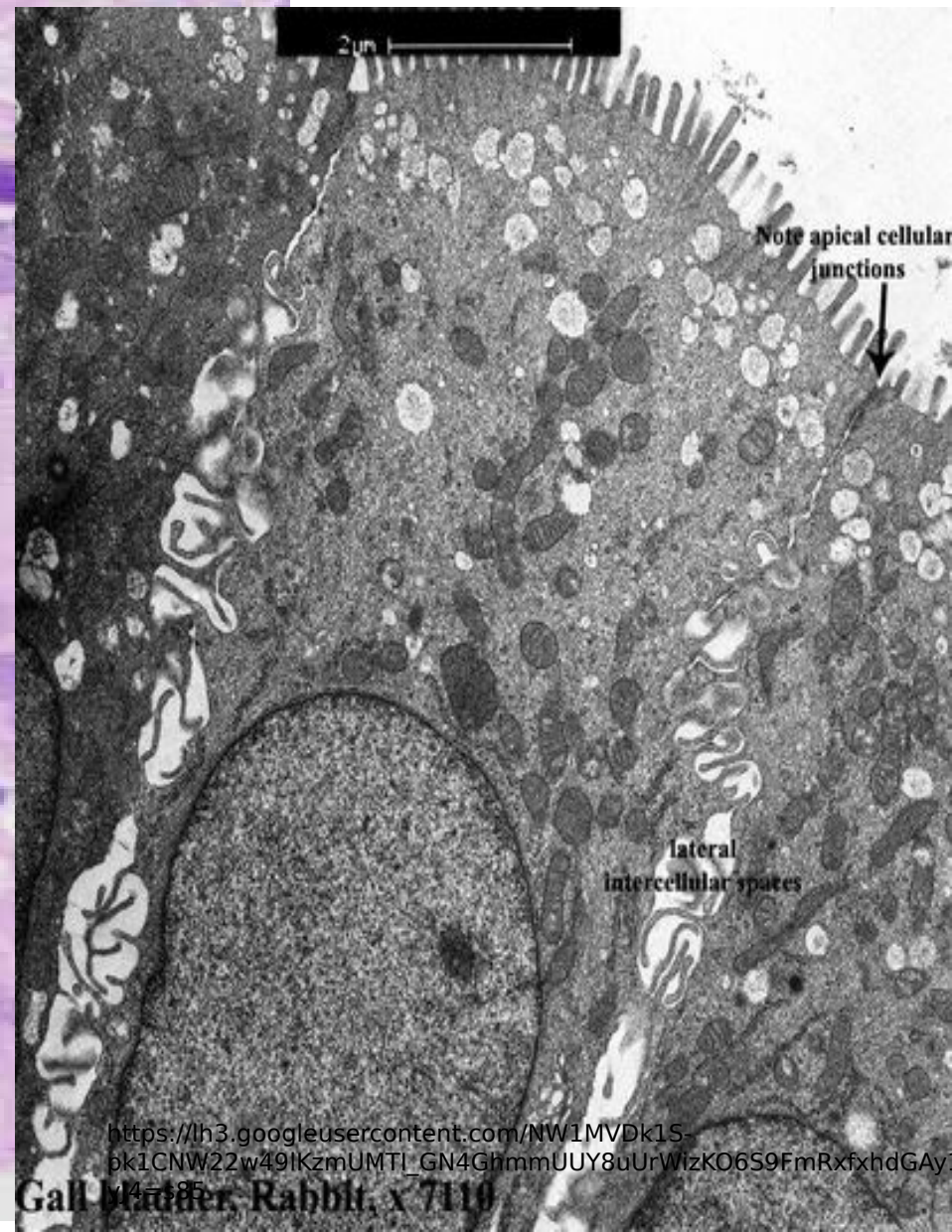


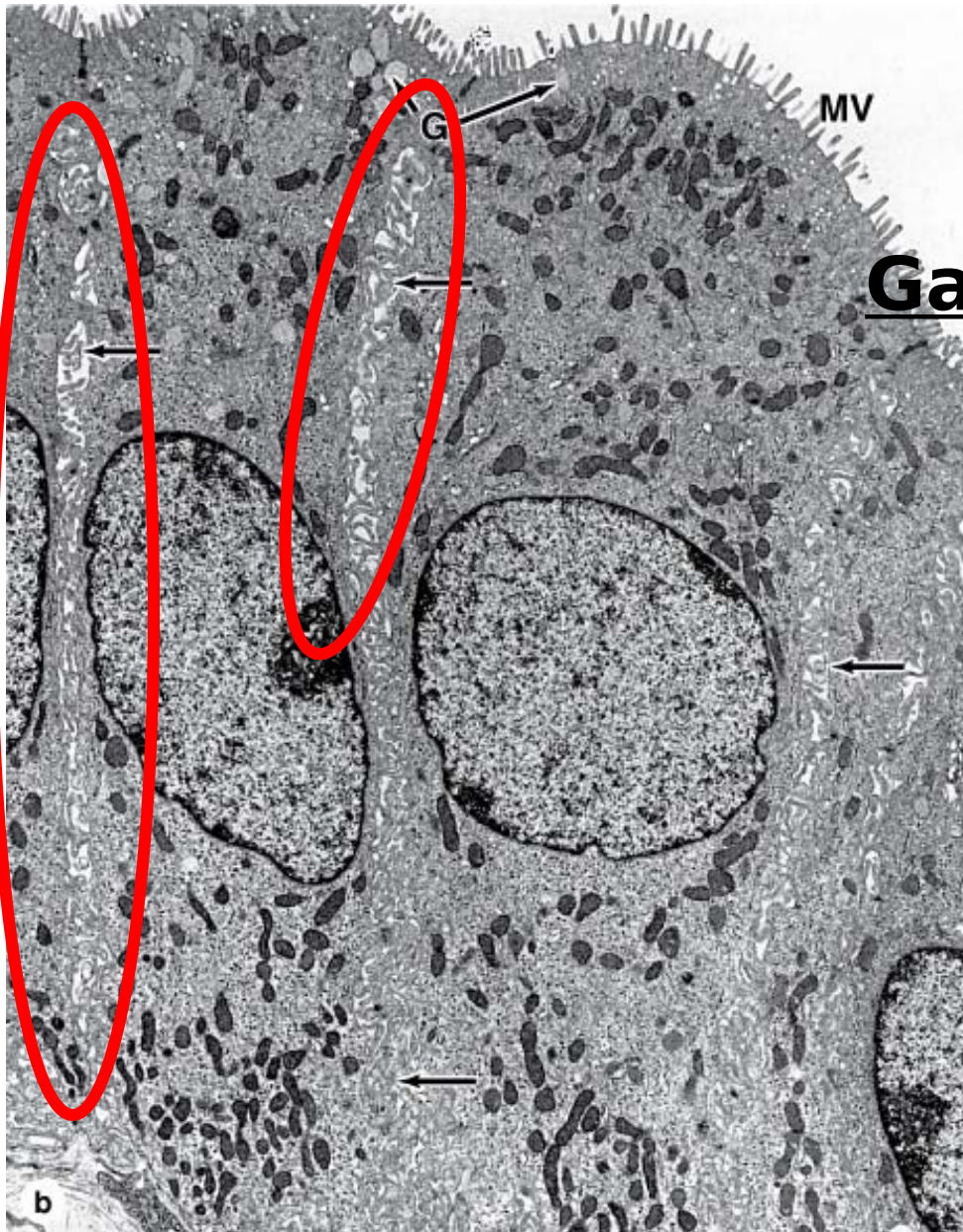
Gall Bladder H&E

tall columnar
epithelium

lamina
propria

https://lh3.googleusercontent.com/uVQhUOpwVoss8bYDw_I1HeYZpHhtaFZqA_ebCoSKPUR-AmCzQB6sH-YR5F5R122FzqKap=s85





Gall bladder epithelium

Microvilli

Mitochondria

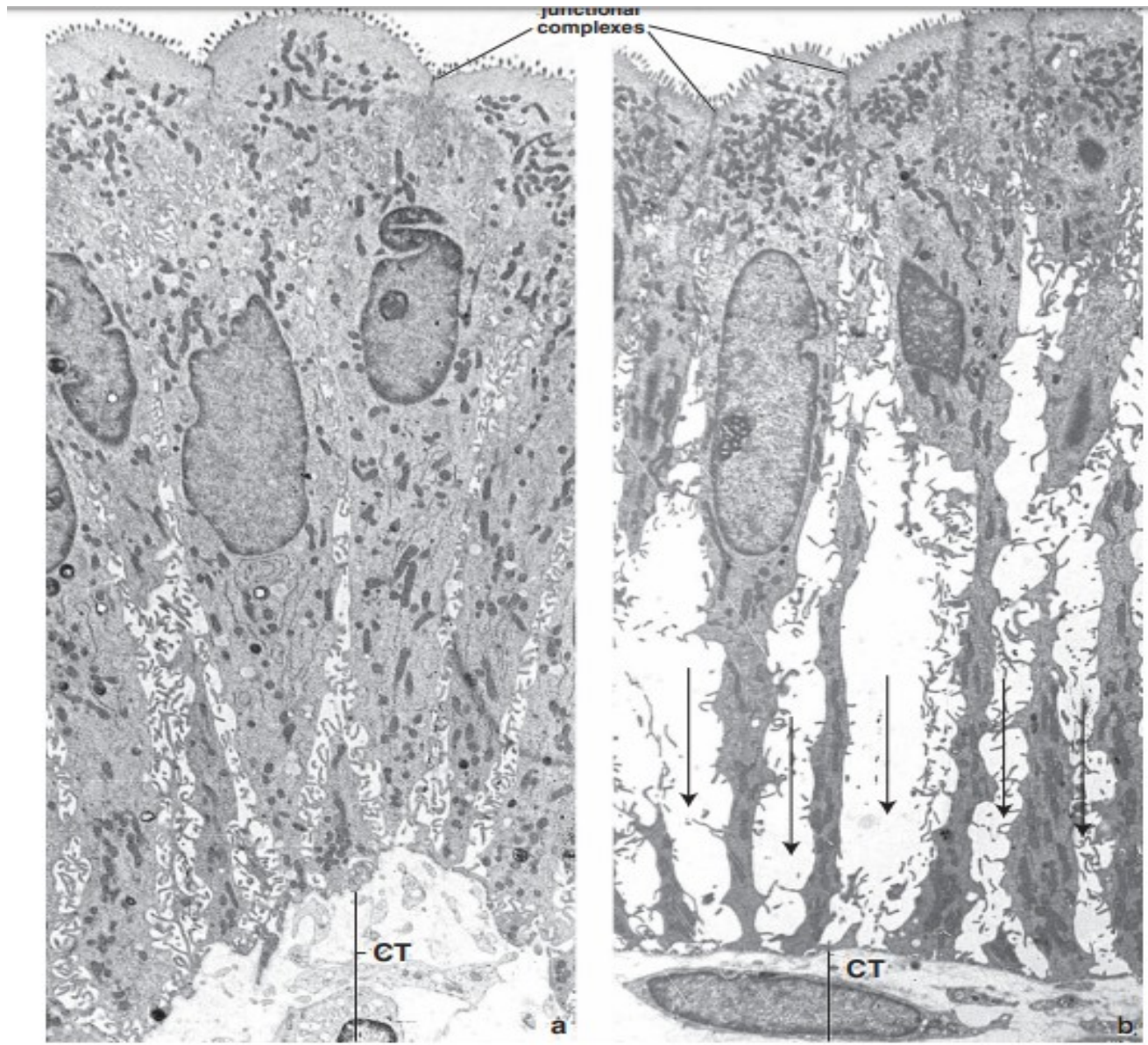
Intercellular spaces

Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas*,
12th Edition: <http://www.accessmedicine.com>

Gall Bladder Epithelium



What is the difference between these 2 photos of columnar epithelium of gall bladder?



The Gall Bladder



- **Function:**
- Concentrates the bile (absorptive) and add mucous (secretory)
- Contraction of its smooth muscle by CCK intermittent discharge of bile in the intestine

Liver regeneration

- **Hepatocytes**
- **Oval cells**: stem cells surrounding the canal of Herring & ductules

Question



One of the following biliary passages is present in the portal tract:

- a) Bile canaliculus
- b) Herring canal
- ☒ c) Preductule
- d) Bile duct

Question



- The bile canaliculus is lined by:
 - a. cubical cells
 - ☒ b. Hepatocytes
 - c. Columnar cells
 - d. cholangiocytes

Summary



Hepatic bile sinusoids are lined by endothelial cells and von Kupffer cells.

Von Kupffer cells are phagocytic with numerous lysosomes

The space of Disse separates the hepatocytes from the blood sinusoids

It contains plasma, reticular fibers and Ito cells.

Ito cells are fat storing cells and can change to fibroblasts to cause fibrosis.

The gall bladder is formed of mucosa, muscle layer and fibrous coat.

Suggested textbooks



- 1- Junqueira`s Basic Histology; Text and Atlas. 14th edition 2016, pp: 329-332.
- 2- Histology atlas and test: Michael H. Ross and Wojciech Pawlina, 7th edition, 2015, pp: 545-553

Thank You

